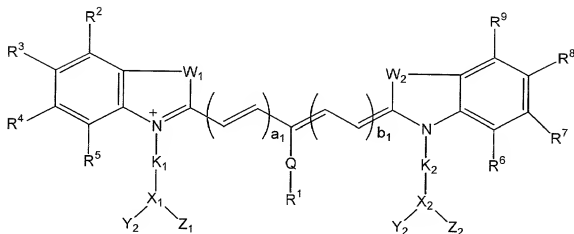


1. A compound having the cyanine dye bioconjugate formula 1



wherein  $W_1$  and  $W_2$  may be the same or different and are selected from the group consisting of  $-\text{CR}^{10}\text{R}^{11}$ ,  $-\text{O}-$ ,  $-\text{NR}^{12}$ ,  $-\text{S}-$ , and  $-\text{Se}-$ ;  $Y_1$ ,  $Y_2$ ,  $Z_1$ , and  $Z_2$  are

- 5 independently selected from the group consisting of hydrogen, tumor-specific agents, phototherapy agents,  $-\text{CONH-Bm}$ ,  $-\text{NHCO-Bm}$ ,  $-(\text{CH}_2)_a-\text{CONH-Bm}$ ,  $-\text{CH}_2-(\text{CH}_2\text{OCH}_2)_b-\text{CH}_2-\text{CONH-Bm}$ ,  $-(\text{CH}_2)_a-\text{NHCO-Bm}$ ,  $-\text{CH}_2-(\text{CH}_2\text{OCH}_2)_b-\text{CH}_2-\text{NHCO-Bm}$ ,  $-(\text{CH}_2)_a-\text{N}(\text{R}^{12})-(\text{CH}_2)_b-\text{CONH-Bm}$ ,  $-(\text{CH}_2)_a-\text{N}(\text{R}^{12})-(\text{CH}_2)_b-\text{NHCO-Bm}$ ,  $-(\text{CH}_2)_a-\text{N}(\text{R}^{12})-\text{CH}_2-(\text{CH}_2\text{OCH}_2)_b-\text{CH}_2-\text{CONH-Bm}$ ,  $-(\text{CH}_2)_a-\text{N}(\text{R}^{12})-\text{CH}_2-$
- 10  $(\text{CH}_2\text{OCH}_2)_b-\text{CH}_2-\text{NHCO-Bm}$ ,  $-\text{CH}_2-(\text{CH}_2\text{OCH}_2)_b-\text{CH}_2-\text{N}(\text{R}^{12})-(\text{CH}_2)_a-\text{CONH-Bm}$ ,  $-\text{CH}_2-(\text{CH}_2\text{OCH}_2)_b-\text{CH}_2-\text{N}(\text{R}^{12})-(\text{CH}_2)_a-\text{NHCO-Bm}$ ,  $-\text{CH}_2-(\text{CH}_2\text{OCH}_2)_b-\text{CH}_2-\text{N}(\text{R}^{12})-\text{CH}_2-(\text{CH}_2\text{OCH}_2)_d-\text{NHCO-Bm}$ ,  $-\text{CONH-Dm}$ ,  $-\text{NHCO-Dm}$ ,  $-(\text{CH}_2)_a-\text{CONH-Dm}$ ,  $-\text{CH}_2-(\text{CH}_2\text{OCH}_2)_b-$

- CH<sub>2</sub>-CONH-Dm, -(CH<sub>2</sub>)<sub>a</sub>-NHCO-Dm, -CH<sub>2</sub>-(CH<sub>2</sub>OCH<sub>2</sub>)<sub>b</sub>-CH<sub>2</sub>-NHCO-Dm, -(CH<sub>2</sub>)<sub>a</sub>-N(R<sup>12</sup>)-(CH<sub>2</sub>)<sub>b</sub>-CONH-Dm, -(CH<sub>2</sub>)<sub>a</sub>-N(R<sup>12</sup>)-(CH<sub>2</sub>)<sub>c</sub>-NHCO-Dm, -(CH<sub>2</sub>)<sub>a</sub>-N(R<sup>12</sup>)-CH<sub>2</sub>-(CH<sub>2</sub>OCH<sub>2</sub>)<sub>b</sub>-CH<sub>2</sub>-CONH-Dm, -(CH<sub>2</sub>)<sub>a</sub>-N(R<sup>12</sup>)-CH<sub>2</sub>-(CH<sub>2</sub>OCH<sub>2</sub>)<sub>b</sub>-CH<sub>2</sub>-NHCO-Dm, -CH<sub>2</sub>-(CH<sub>2</sub>OCH<sub>2</sub>)<sub>b</sub>-CH<sub>2</sub>-N(R<sup>12</sup>)-(CH<sub>2</sub>)<sub>a</sub>-CONH-Dm, -CH<sub>2</sub>-(CH<sub>2</sub>OCH<sub>2</sub>)<sub>b</sub>-CH<sub>2</sub>-N(R<sup>12</sup>)-CH<sub>2</sub>-(CH<sub>2</sub>OCH<sub>2</sub>)<sub>d</sub>-CONH-Dm, -CH<sub>2</sub>-(CH<sub>2</sub>OCH<sub>2</sub>)<sub>b</sub>-CH<sub>2</sub>-N(R<sup>12</sup>)-CH<sub>2</sub>-(CH<sub>2</sub>OCH<sub>2</sub>)<sub>d</sub>-NHCO-Dm, -(CH<sub>2</sub>)<sub>a</sub>-N R<sup>12</sup>R<sup>13</sup>, and -CH<sub>2</sub>(CH<sub>2</sub>OCH<sub>2</sub>)<sub>b</sub>-CH<sub>2</sub>N R<sup>12</sup>R<sup>13</sup>; K<sub>1</sub> and K<sub>2</sub> are independently selected from the group consisting of C<sub>1</sub>-C<sub>30</sub> alkyl, C<sub>5</sub>-C<sub>30</sub> aryl, C<sub>1</sub>-C<sub>30</sub> alkoxy, C<sub>1</sub>-C<sub>30</sub> polyalkoxyalkyl, C<sub>1</sub>-C<sub>30</sub> polyhydroxyalkyl, C<sub>5</sub>-C<sub>30</sub> polyhydroxyaryl, C<sub>1</sub>-C<sub>30</sub>
- 5 aminoalkyl, saccharides, peptides, -CH<sub>2</sub>(CH<sub>2</sub>OCH<sub>2</sub>)<sub>b</sub>-CH<sub>2</sub>-, -(CH<sub>2</sub>)<sub>a</sub>-CO-, -(CH<sub>2</sub>)<sub>a</sub>-CONH-, -CH<sub>2</sub>-(CH<sub>2</sub>OCH<sub>2</sub>)<sub>b</sub>-CH<sub>2</sub>-CONH-, -(CH<sub>2</sub>)<sub>a</sub>-NHCO-, -CH<sub>2</sub>-(CH<sub>2</sub>OCH<sub>2</sub>)<sub>b</sub>-CH<sub>2</sub>-NHCO-, -(CH<sub>2</sub>)<sub>a</sub>-O-, and -CH<sub>2</sub>-(CH<sub>2</sub>OCH<sub>2</sub>)<sub>b</sub>-CO-; X<sub>1</sub> and X<sub>2</sub> are single bonds, or are independently selected from the group consisting of nitrogen, saccharides, -CR<sup>14</sup>-, -CR<sup>14</sup>R<sup>15</sup>-, -NR<sup>16</sup>R<sup>17</sup>-; C<sub>5</sub> - C<sub>30</sub> aryl; Q is a single bond or is selected from
- 10 the group consisting of -O-, -S-, -Se-, and -NR<sup>18</sup>-; a, and b<sub>1</sub> independently vary from 0 to 5; R<sup>1</sup> to R<sup>13</sup>, and R<sup>18</sup> are independently selected from the group consisting of hydrogen, C<sub>1</sub>-C<sub>10</sub> alkyl, C<sub>5</sub>-C<sub>20</sub> aryl, C<sub>1</sub>-C<sub>10</sub> alkoxy, C<sub>1</sub>-C<sub>10</sub> polyalkoxyalkyl, C<sub>1</sub>-C<sub>20</sub> polyhydroxyalkyl, C<sub>5</sub>-C<sub>20</sub> polyhydroxyaryl, C<sub>1</sub>-C<sub>10</sub> aminoalkyl, cyano, nitro, halogens, saccharides, peptides, -CH<sub>2</sub>(CH<sub>2</sub>OCH<sub>2</sub>)<sub>b</sub>-
- 20 CH<sub>2</sub>-OH, -(CH<sub>2</sub>)<sub>a</sub>-CO<sub>2</sub>H, (CH<sub>2</sub>)<sub>a</sub>-CONH-Bm, -CH<sub>2</sub>-(CH<sub>2</sub>OCH<sub>2</sub>)<sub>b</sub>-CH<sub>2</sub>-CONH-Bm, -(CH<sub>2</sub>)<sub>a</sub>-NHCO-Bm, -CH<sub>2</sub>-(CH<sub>2</sub>OCH<sub>2</sub>)<sub>b</sub>-CH<sub>2</sub>-NHCO-Bm, -(CH<sub>2</sub>)<sub>a</sub>-OH and -CH<sub>2</sub>-(CH<sub>2</sub>OCH<sub>2</sub>)<sub>b</sub>-CO<sub>2</sub>H; R<sup>14</sup> to R<sup>17</sup> are independently selected from the group consisting of hydrogen, C<sub>1</sub>-C<sub>10</sub> alkyl, C<sub>5</sub>-C<sub>20</sub> aryl, C<sub>1</sub>-C<sub>10</sub> alkoxy, C<sub>1</sub>-C<sub>10</sub> polyalkoxyalkyl, C<sub>1</sub>-C<sub>20</sub> polyhydroxyalkyl, C<sub>5</sub>-C<sub>20</sub> polyhydroxyaryl, C<sub>1</sub>-C<sub>10</sub>
- 25 aminoalkyl, saccharides, peptides, -CH<sub>2</sub>(CH<sub>2</sub>OCH<sub>2</sub>)<sub>b</sub>-CH<sub>2</sub>-, -(CH<sub>2</sub>)<sub>a</sub>-CO-, -(CH<sub>2</sub>)<sub>a</sub>-CONH-, -CH<sub>2</sub>-(CH<sub>2</sub>OCH<sub>2</sub>)<sub>b</sub>-CH<sub>2</sub>-CONH-, -(CH<sub>2</sub>)<sub>a</sub>-NHCO-, -CH<sub>2</sub>-(CH<sub>2</sub>OCH<sub>2</sub>)<sub>b</sub>-CH<sub>2</sub>-

NHCO-,  $-(CH_2)_a-O-$ , and  $-CH_2-(CH_2OCH_2)_b-CO-$ ; Bm and Dm are independently selected from the group consisting of bioactive peptides, proteins, cells, antibodies, antibody fragments, saccharides, glycopeptides, peptidomimetics, drugs, drug mimics, hormones, metal chelating agents, radioactive or

- 5 nonradioactive metal complexes, echogenic agents, photoactive molecules, and phototherapy agents; a and c independently vary from 1 to 20; b and d independently vary from 1 to 100.

2. The compound of claim 1 wherein W<sub>1</sub> and W<sub>2</sub> are independently selected from the group consisting of  $-C(CH_3)_2$ ,  $-C((CH_2)_aOH)CH_3$ ,  $-C((CH_2)_aOH)_2$ ,  $-C((CH_2)_aCO_2H)CH_3$ ,  $-C((CH_2)_aCO_2H)_2$ ,  $-C((CH_2)_aNH_2)CH_3$ ,  $-C((CH_2)_aNH_2)_2$ ,  $-C((CH_2)_aNR^{12}R^{13})_2$ ,  $-NR^{12}$ , and  $-S-$ ; Y<sub>1</sub> and Y<sub>2</sub> are selected from

- 10 the group consisting of hydrogen, tumor-specific agents,  $-CONH-Bm$ ,  $-NHCO-Bm$ ,  $-(CH_2)_a-CONH-Bm$ ,  $-CH_2-(CH_2OCH_2)_b-CH_2-CONH-Bm$ ,  $-(CH_2)_a-NHCO-Bm$ ,  $-CH_2-(CH_2OCH_2)_b-CH_2-NHCO-Bm$ ,  $-(CH_2)_a-NR^{12}R^{13}$ , and  $-CH_2(CH_2OCH_2)_b-CH_2NR^{12}R^{13}$ ; Z<sub>1</sub> and Z<sub>2</sub> are independently selected from the group consisting of hydrogen, phototherapy agents,  $-CONH-Dm$ ,  $-NHCO-Dm$ ,  $-(CH_2)_a-CONH-Dm$ ,  $-CH_2-(CH_2OCH_2)_b-CH_2-CONH-Dm$ ,  $-(CH_2)_a-NHCO-Dm$ ,  $-CH_2-(CH_2OCH_2)_b-CH_2-NHCO-Dm$ ,  $-(CH_2)_a-NR^{12}R^{13}$ , and  $-CH_2(CH_2OCH_2)_b-CH_2NR^{12}R^{13}$ ; K<sub>1</sub> and K<sub>2</sub> are independently selected from the group consisting of C<sub>1</sub>-C<sub>10</sub> alkyl, C<sub>6</sub>-C<sub>20</sub> aryl, C<sub>1</sub>-C<sub>20</sub> alkoxy, C<sub>1</sub>-C<sub>20</sub> aminoalkyl,  $-(CH_2)_a-CO-$ ,  $-(CH_2)_a-CONH-$ ,  $-CH_2-(CH_2OCH_2)_b-CH_2-CONH-$ ,  $-(CH_2)_a-NHCO-$ ,  $-CH_2-(CH_2OCH_2)_b-CH_2-NHCO-$ , and  $-CH_2-(CH_2OCH_2)_b-CO-$ ; X<sub>1</sub> and X<sub>2</sub> are single bonds, or are independently selected
- 15 from the group consisting of nitrogen,  $-CR^{14}$ ,  $-CR^{14}R^{15}$ , and  $-NR^{16}R^{17}$ ; Q is a single bond or is selected from the group consisting of  $-O-$ ,  $-S-$ , and  $-NR^{18}$ ; a, and b, independently vary from 0 to 3; Bm is selected from the group consisting